wasteful, it is useful to direct the currents of gas and the cold air for their combustion upward toward the dome of the stove and give the combustion chamber an arrangement similar to that shown in Fig. 73. There are many advantages in constructing a hot-blast stove in this manner. In the Cowper hot-blast stove the combustion chamber actually occupies nearly 35 per cent of the space inside of the shell and causes an unnecessary increase of nearly 50 per cent in the cost of the stove. The analysis of this particular case of combustion-chamber construction permits the following rules to be deduced:

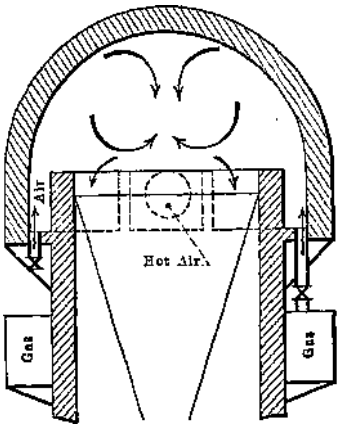


FIG. 73.

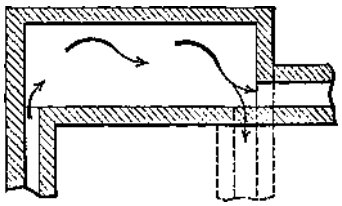

FIG. 74.

1. The jet of flame in the chamber should not be directed horizontally.
2. The streams or jets of gas and air entering the chamber should be, where possible, directed upward toward the dome or roof.
3. The products of combustion should be carried away from the combustion chamber at the hearth level, in either a vertical or a horizontal direction, as shown in Fig. 74.

Nevertheless, it is

sometimes necessary that a vertical combustion-chamber should be used. In this case, it is not necessary to repeat the error made by Cowper and construct the chamber as an *open pit* (Fig. 70). It can be covered by an arch pierced by one or

*Note by English translator.*—Although Professor Groume-Grjimailo announced his theories over ten years ago they have not become very widely known. Confusion and lack of knowledge still prevail among the designers of hot-blast stoves. The direction of the natural convection currents of hot gases in cooling and of cold gases in heating are ignored by the constructors of three- and four-pass stoves.